

DEPARTMENT OF THE INTERIOR—U. S. GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

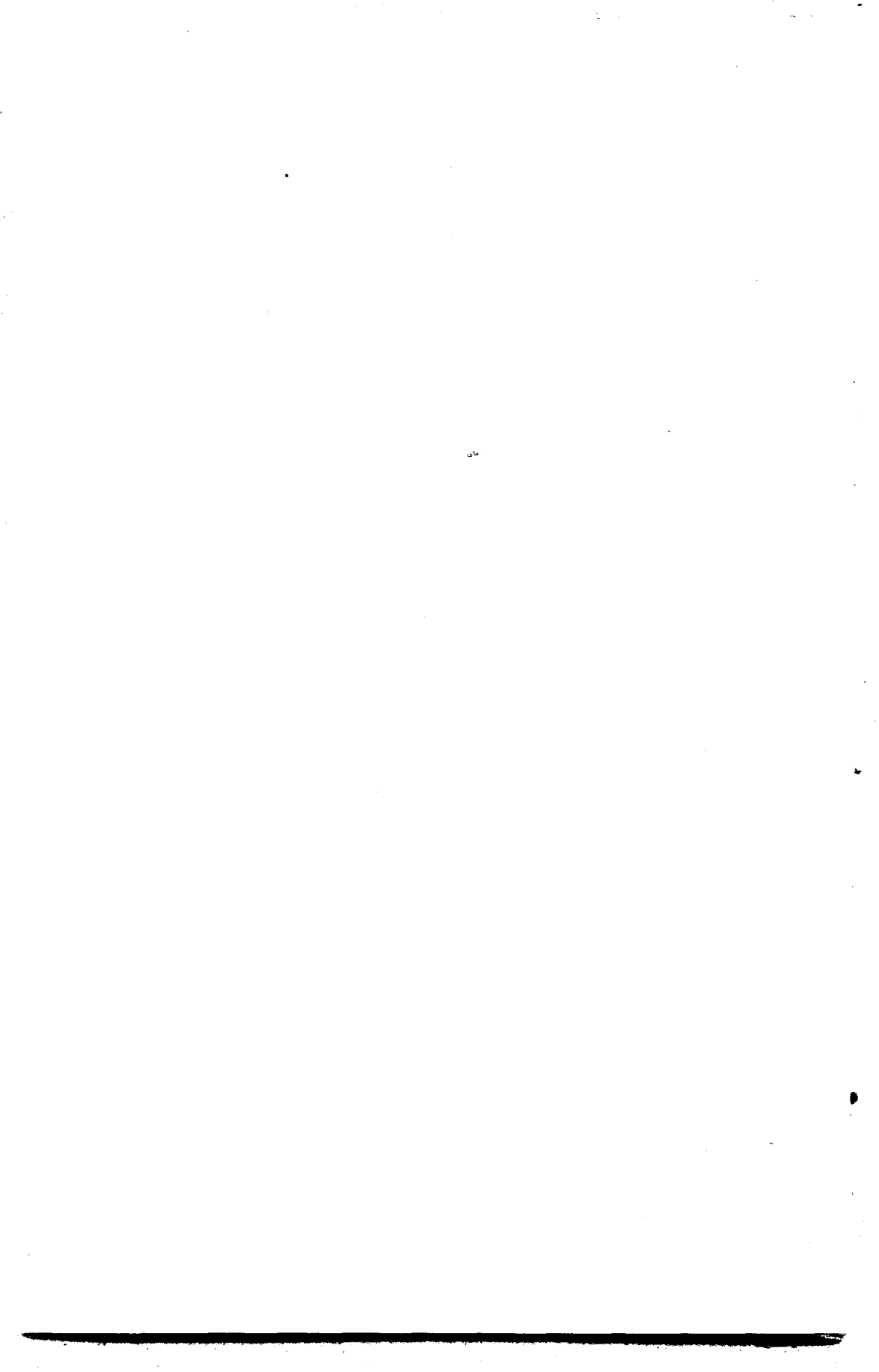
THE PRODUCTION OF
TALC AND SOAPSTONE
IN 1908

By J. S. DILLER

ADVANCE CHAPTER FROM MINERAL RESOURCES OF THE UNITED STATES
CALENDAR YEAR 1908



WASHINGTON
GOVERNMENT PRINTING OFFICE
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TALC AND SOAPSTONE.

By J. S. DILLER.

INTRODUCTION.

The salient feature of the talc and soapstone industry for 1908 is the considerable decrease in the total output from the previous year, due to the general decline in trade conditions. The total output for 1908 was 117,324 short tons, a decrease of nearly 17 per cent from that of 1907.

The production of talc and soapstone was limited exclusively to the belt of ancient crystalline rocks which form the axis of the Appalachian Mountain system from Canada to Alabama. Talc or soapstone quarries were operated in ten States on the Atlantic slope, viz, Vermont, Massachusetts, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Virginia, North Carolina, and Georgia.

In New York, the State which produced by far the larger part of the talc obtained in this country, and also at Hewitts, in North Carolina, the masses of talc have the form of layers or beds, conformably interstratified with marble, schists, and gneisses, after the manner of sedimentary rocks.

At some of the other localities, however, the deposits of talc and soapstone are less regular. Their mode of occurrence as well as their association and mineralogical composition strongly suggest that they have been derived from igneous rocks, such as pyroxenite.

VARIETIES AND CHARACTERISTICS.

In chemical composition, talc is a hydrous silicate of magnesia. Pure talc is generally foliated like mica, but may be fibrous. The laminae, though flexible, are not elastic. Both foliated and fibrous forms of talc are abundant in different parts of the mines in New York.

The most distinctive physical features of talc are its softness, being easily impressed by the finger nail, and its greasy, soapy feel. It is practically infusible, not decomposed by ordinary acids, and a good nonconductor of heat and electricity. When highly heated, it loses a small amount of water, hardens, and becomes susceptible to polish. It varies in color from apple-green to white. Its softness, flexibility, and smoothness, in connection with its resistance to high temperatures and acids, are the qualities which render it most useful.

The massive form, usually gray, crystalline, and more or less impure, occurs in large bodies, and is commonly known as soapstone.

USES.

The practice in mining talc and soapstone and preparing it for use is for the most part either to saw it into slabs, as at the quarries in Virginia, or to grind it into powder, as at the mines in New York.

Being soft and sectile, it is easily sawed or carved into any shape, and is extensively used for washtubs, sanitary appliances, laboratory tanks and tables, electrical switchboards, hearthstones, mantels, fire brick, kiln linings, furnaces, cupolas, converters, gas burners, foot warmers, slate pencils, and "crayons" for marking iron, glass, and fabrics.

The powder of foliated talc is used instead of mica for imparting luster to wall paper. The powdered form of fibrous talc is extensively used in the manufacture of paper. On account of the strength and durability the minutely fibrous talc imparts to the paper, it is replacing china clay, which has been extensively used in the past and which renders the paper brittle. Talc has a wide use to-day as a pigment in high-grade paints. On account of its great natural stability, it should be well adapted to this purpose, but, as shown by the scientific section of the Paint Manufacturers' Association of the United States, its proportion to the other pigments with which it is used should be moderate. If used in excess, it cheapens and adulterates the paint. As a heat insulator, it is used for boiler and pipe coverings. It finds extensive use as a lubricant to lessen friction, also for polishing glass, dressing skins and leather, and making various toilet powders, as well as for dynamite and for sizing for cotton cloth.

It is said to have been used in adulterating sugar, baking powder, and flour. In response to an inquiry as to the use of talc for adulterating the articles of food mentioned, Dr. H. W. Wiley, chief of the Bureau of Chemistry, Department of Agriculture, replied:^a "There is no doubt of the fact that it has been used for all these purposes to some extent. I have never found, however, any mineral substance of that kind in sugar. It has been extensively advertised for flour, but we have never found a sample of flour containing any of it. In so far as baking powders are concerned, I do not think we have ever found any. My impression is that the use of any kind of talc for the purpose mentioned is extremely limited, but there is no doubt that it has been used occasionally."

PRODUCTION.

The total production of all forms of talc in 1908 was 117,354 short tons, valued at \$1,401,222, a decrease in quantity of over 16 per cent from the production of 1907, but a decrease in value of less than 9 per cent. The smaller decrease in value is due chiefly to the general advance in prices. The financial depression of 1903 was marked by a decline in output of talc of 11 per cent from the production of 1902. This was followed by four years of rapid rise in production and then by a marked decline of 16 per cent in 1908.

The diminished production applies to all the States except New York and Massachusetts. In New York the output increased 4 per cent and in Massachusetts the output, though not very large, was

^a Official letter, dated April 20, 1909.

more than double that of 1907—a marked increase resulting from the erection of a new mill at Zoar, in Franklin County.

The following table shows the progress of the talc industry in recent years:

Production of talc and soapstone in the United States, 1880-1908, in short tons.

Year.	Quantity.	Value.	Year.	Quantity.	Value.
1880-1900.....	969,928	\$11,224,652	1905.....	96,634	\$1,082,062
1901.....	97,843	908,488	1906.....	120,644	1,431,556
1902.....	97,954	1,140,507	1907.....	139,810	1,531,047
1903.....	86,901	840,060	1908.....	117,354	1,401,222
1904.....	91,189	940,731			

The talc and soapstone quarried and prepared for market are most conveniently classified, as shown in the following table, into four classes or groups, viz, rough or crude, sawed into slabs, manufactured articles, and ground. The table shows the quantity produced in each class annually, the total value, and the average price per ton from 1905 to 1908.

Production of talc and soapstone in the United States according to varieties, 1905-1908, in short tons.

Condition in which marketed.	1905.			1906.		
	Quantity.	Value.	Average price per ton.	Quantity.	Value.	Average price per ton.
Rough.....	1,625	\$10,483	\$6.45	15,211	\$40,337	\$2.65
Sawed into slabs.....	4,779	80,879	16.92	4,980	83,563	16.78
Manufactured articles ^a	14,065	403,660	27.55	23,575	631,342	26.78
Ground ^b	75,565	587,040	7.77	76,878	676,314	8.80
Total ^c	96,634	1,082,062	11.20	120,644	1,431,556	11.87

Condition in which marketed.	1907.			1908.		
	Quantity.	Value.	Average price per ton.	Quantity.	Value.	Average price per ton.
Rough.....	25,538	\$34,625	\$1.36	3,013	\$7,819	\$2.60
Sawed into slabs.....	4,822	91,688	19.01	3,406	71,048	20.86
Manufactured articles ^a	23,484	648,475	27.61	16,336	442,624	27.10
Ground ^b	85,966	756,279	8.80	94,599	879,731	9.20
Total ^c	139,810	1,531,047	10.95	117,354	1,401,222	11.94

^a Includes bath and laundry tubs; fire brick for stoves, heaters, etc.; hearthstones, mantels, sinks, griddles, slate pencils, gas tips, burner blanks, crayons, and numerous other articles for everyday use.

^b For foundry facings, paper making, lubricators for dressing skins and leather, etc.

^c Exclusive of the quantity used for pigment, which is included among mineral paints.

Only 2.5 per cent of the product was sold crude in 1908, 3 per cent was sold sawed into slabs, 14 per cent was sold as manufactured articles; and 80.5 per cent was sold ground. When, however, we consider the values represented the percentages are very different. The value of the crude was one-half of 1 per cent of the total value, that of the sawed into slabs 5 per cent, that of the manufactured articles 32 per cent, and that of the ground 62.5 per cent.

The production of New York alone exceeded in quantity that of all the other States combined. In quantity and value Virginia ranks next to New York. The product in New York is all talc and it is all

ground; in Virginia the product is soapstone, and it is sawed and manufactured into various articles. In North Carolina and Vermont there is greater variety in the production. By far the larger part of the product in both States is ground, yet here also a considerable part of the product is sold crude, sawed into slabs, and as manufactured articles.

Production of talc and soapstone, 1906-1908, by States, in short tons.

State.	1906.		1907.		1908.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Georgia.....	(a)	(a)	739	\$11,473	(a)	(a)
Maryland.....	2,956	\$23,310	5,064	32,250	(a)	(a)
New Jersey and Pennsylvania.	13,981	52,961	17,103	46,871	4,648	\$29,118
New York.....	61,672	557,200	67,800	626,000	70,739	697,390
North Carolina.....	4,009	66,729	4,085	74,347	3,564	51,443
Vermont.....	10,413	101,057	16,200	82,500	10,755	99,743
Virginia.....	23,624	590,800	26,278	631,880	19,616	458,252
Other States ^b	3,989	39,499	2,541	25,726	8,032	65,276
Total.....	120,644	1,431,556	139,810	1,531,047	117,354	1,401,222

^a Included in "Other States."

^b Georgia, Massachusetts, and Rhode Island, in 1906; California, Massachusetts, and Rhode Island, in 1907; Georgia, Maryland, Massachusetts, and Rhode Island, in 1908.

Production of talc and soapstone in the United States, 1880-1908, in short tons.

Year.	New York.		All other States.		Total.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1880-1900.....	629,925	\$5,933,501	340,003	\$5,291,151	969,928	\$11,224,652
1901.....	69,200	483,600	28,643	424,888	97,843	908,488
1902.....	71,100	615,350	26,854	525,157	97,954	1,140,507
1903.....	60,230	421,600	26,671	418,460	86,901	840,060
1904.....	64,005	507,400	27,184	433,331	91,189	940,731
1905.....	56,500	445,000	40,134	637,062	96,634	1,082,062
1906.....	61,672	557,200	58,972	874,356	120,644	1,431,556
1907.....	67,800	626,000	72,010	905,047	139,810	1,531,047
1908.....	70,739	697,390	46,615	703,832	117,354	1,401,222
Total.....	1,151,171	10,287,041	667,086	10,213,284	1,818,257	20,500,325

IMPORTS.

The total imports of talc for consumption in 1908 were 7,429 short tons, a decrease of over 26 per cent from the imports of 1907. On the other hand, the average price per ton of the imports in 1908 increased 4 per cent over the average price of 1907. Only the better grades of talc produced are imported, which accounts for the higher average price for foreign as compared with domestic talc.

Talc imported into the United States, 1902-1908, in short tons.

Year.	Quantity.	Value.	Average price per ton.	Year.	Quantity.	Value.	Average price per ton.
1902.....	2,859	\$35,366	\$12.36	1906.....	5,643	\$67,818	\$12.02
1903.....	1,791	19,677	10.99	1907.....	10,060	126,391	12.56
1904.....	3,268	36,370	11.13	1908.....	7,429	97,096	13.07
1905.....	4,000	48,225	12.05				

TALC DEPOSITS, BY STATES.

NORTH CAROLINA.

North Carolina is the fifth State in the order of production, and has five active mines, of which that of the North Carolina Talc and Mining Company, near Hewitts, in Swain County, is the largest producer. A detailed description of the occurrence of talc and soapstone in the vicinity of Hewitts is given by Keith in the Nantahala folio and in the Contributions to Economic Geology for 1902.^a The talc occurs as series of lenticular masses and sheets in the blue and white marbles of Cambrian age along the Nantahala Valley and Nottely River. Talc associated with limestone is most likely derived from sedimentary rock. It is found also in the Great Smoky conglomerate of Cambrian age, and in the Archean rocks, where its association with peridotites is such as to show that it is derived from igneous rocks.

The Cambrian marbles have a length of outcrop of about 40 miles in North Carolina and are continued in Georgia for a much greater distance. Talc is known to occur in more than twenty-five places along the marble belt of North Carolina, but is less common in Georgia. The lenticular bodies inclosed in the marble vary in size from mere scales to masses 50 feet thick and 200 feet long.

Owing to its soft nature, the talc does not withstand weathering, but readily crumbles down. It does not outcrop, therefore, and its position is indicated merely by fragments of weathered material on the surface. Thus, it is impossible to determine the full extent of the talc bodies, except where they are exposed by mining. For the same reason, it is probable that many bodies of talc have thus far escaped observation. Some of the bodies are so extensive that they resemble sheets of sedimentary matter. This is especially the case where the talc sheets grade into the adjoining sandstone beds. They are termed "veins" by the miners, but they have none of the characteristics of true veins.

The talc varies in color from dull white and opaque, where weathered, to dull bluish green or pale green and translucent, where the solid rock is freshest. Inasmuch as the methods of manufacture of the talc depend upon its softness, any impurities which may affect this quality are a detriment. Thus it happens that the occurrence of numerous acicular or prismatic crystals of amphibole or pyroxene greatly depreciate the value of some of the large deposits of talc. In North Carolina talc is mined partly in open cuts and partly in shafts and tunnels. By far the greater portion of it is ground to powder, but some of it is sawed into slabs and manufactured into small articles, such as pencils, crayons, and gas tips, as well as electrical and thermal insulators of various forms.

The talc deposits associated with the Murphy marble are readily accessible to the Southern Railway, but other deposits of talc which occur in the Great Smoky conglomerate, as well as the bodies of soapstone associated with dunite in the Archean rocks, though large, are so remote from transportation that they are generally undeveloped. It is interesting to note, however, that since the extension of the railroad down the Little Tennessee from Bushnell one of the masses of

^a Keith, Arthur, Nantahala folio (No. 143), Geol. Atlas U. S., U. S. Geol. Survey, 1907; also Bull. U. S. Geol. Survey No. 213, 1903, p. 443

fine foliated talc in the conglomerate is being worked 2 miles southwest of Wayside and hauled to Hewitts to be ground.

Pyrophyllite.—Pyrophyllite, though unlike talc, in being a hydrous silicate of alumina instead of a hydrous silicate of magnesia, is so closely related to talc in many of its physical properties that it is mined and used for the same purposes, although it does not command so high a price as the best grades of talc. Moistened with cobalt solution and ignited, talc becomes pale red, and pyrophyllite under the same conditions becomes deep blue. Thus the two minerals may be readily distinguished.

In the region where it is mined, pyrophyllite is sometimes erroneously called agalmatolite, because of its general resemblance to the mineral so commonly used in China for small images.

The only mines of pyrophyllite in the United States are in Moore and Chatham counties, N. C., and they are widely separated from the talc and soapstone mines of the same State.

The pyrophyllite rock forms a narrow belt about 8 miles in length, northeast and southwest, which is crossed by Deep River near the middle, in the vicinity of Glendon, where the quarries are located. This belt is 500 feet in width and of considerable but unknown depth. It is bounded by siliceous and iron breccias, which separate it from slates. Not over 100 feet of the belt is workable, and of this only 25 per cent is commercial pyrophyllite. The principal impurity is quartz, arranged in veins and bands, with some chlorite and magnetite. The presence of impurities, chiefly quartz, in the pyrophyllite would make the ground product gritty, and it therefore causes considerable waste of the material mined. Pratt proposed to use this waste for fire brick.^a

On the basis of its chemical composition, pyrophyllite has been regarded as more nearly allied to clay than to talc. From agalmatolite it differs in containing only a trace of potash.

The Durham and Charlotte Railroad at Glendon affords convenient transportation for the pyrophyllite. Two quarries reported production in 1908. There were also several other companies with mills erected actively engaged in prospecting and development.

VIRGINIA.

Virginia is by far the most important State in the production of soapstone. Over 90 per cent of the nearly 20,000 tons it produced was sawed into slabs for manufacturing laundry and laboratory appliances, while less than 10 per cent was ground into powder and used for foundry and other purposes where color and a high degree of purity is not essential.

Almost the whole of the soapstone in Virginia comes from a long, narrow belt running northeast from Nelson County into Albemarle County. It begins about 20 miles northeast of Lynchburg and lies nearly midway between the main line of the Southern Railway and the James River division of the Chesapeake and Ohio Railway. As these railroads are only about 6 miles apart, the facilities for transportation are favorable.

The geology of the soapstone belt has been briefly described by T. L. Watson,^b state geologist, but until the belt has been definitely

^a Pratt, J. H., North Carolina Geol. Survey Economic Paper No. 3, p. 99.

^b Mineral Resources of Virginia, published by the Virginia-Jamestown Exposition Commission, 1907, p. 293.

mapped, the form, size, and relations of the soapstone to the adjacent rocks can not be clearly understood. The soapstone occurs in sheets, layers, or dike-like masses 100 or more feet in thickness and somewhat irregularly distributed throughout a belt nearly 30 miles in length and less than a mile in width. The general distribution of the soapstone strongly suggests conformable stratification with the quartzites and micaceous schists with which it is locally associated, but its more common and intimate association is with a greenish rock having decidedly the aspect of an eruptive and suggesting an igneous origin for the rock from which the soapstone is derived. In New York and North Carolina, where the layers of talc are clearly derived from a sedimentary rock, it is interbedded with limestone; but in Virginia there is no limestone near the soapstone.

The soapstone quarried varies in color from light bluish-gray to dark greenish-gray, and in hardness from that which is easily scratched by the finger nail to that upon which the finger nail makes no impression. The light-colored soft soapstone is the best grade and contains the most talc. The softness of the stone is in a large measure proportional to the talc it contains. The soapstone richest in talc is not only the easiest and most satisfactory to work, but is the best for most of the uses to which soapstone is applied. This best grade of soapstone, examined in thin section under a microscope, is found to be composed chiefly of scales of talc with a small proportion of chlorite and magnetite and traces of either or of both amphibole and pyroxene.

The dark-greenish soapstone, which occurs with the light colored more or less abundantly in all the quarries, owes its green color to the abundance of chlorite and its greater hardness in part to chlorite, but more particularly to the greater proportion of the silicates—hornblende and pyroxene—both of which are much harder than talc. Hornblende and pyroxene are the minerals from which, by alteration, the talc is derived. The dark-green hard grade of soapstone, if it were more altered so that the pyroxene and amphibole were changed to talc, would become the better grade of soapstone.

In May, 1909, when the writer visited the Albemarle-Nelson County soapstone belt, there were six plants in operation. Beginning at the northeast, they were as follows: The Virginia Soapstone Company, which from its large quarries at Schuyler supplied its two large mills, one at Schuyler and the other at Alberene; the Old Dominion, the Climax, the Phoenix, and the Piedmont, all in operation, with quarries and mills running; and the Eureka, which lately succeeded the Plumbers and at which the quarry only and not the mill was in operation.

All the quarries are well equipped with channeling machines and mills for sawing the slabs or shaping and dressing the manufactured articles. The excellent quality of this soapstone adapts it to a wide range of uses. Laundry tubs are the chief manufactured product, but it is used extensively for sinks and other sanitary devices, as well as for electrical appliances and cooking utensils.

There are two small soapstone quarries in Fairfax County—one near Clifton and the other near Wiehle. At Clifton the soapstone is ground, but at Wiehle, where it is much fractured, decomposed, and stained by oxide of iron, it is sold crude just as it is taken from the quarry.

NEW YORK.

New York easily outranks all other States in the production of talc. All of the output comes from a small district about a dozen miles southeast of Gouverneur, in St. Lawrence County, which has been worked for many years. The geology of the district and the genesis of the talc has been well described by C. H. Smith, jr.^a Gneisses are the most abundant rocks of that region, but crystalline limestones form large irregular belts trending northeast and southwest in the gneiss parallel to its banded structure. Much of the limestone is suitable for building and monumental purposes, but the greater portion of it is impure and contains many more or less schistose layers in which the silicates, tremolite, and enstatite are the chief constituents.

One of the largest and by far the most important of the layers of schist yet discovered is in a limestone belt which stretches from Fowler northeastward to a point near Edwards, a distance of 7 miles, and contains the valuable talc deposits of that district. The schist is conformable with the limestone, into which it gradually passes, both above and below. Their relations are such as to indicate that both belong to the same formation and are of sedimentary origin.

The talc is not only intimately associated with tremolite and enstatite, but grades into them so completely as to demonstrate that the talc is derived from the tremolite and enstatite by alteration. In many places the talc shows more or less distinctly the bladed, columnar, or fibrous structure which characterizes tremolite and enstatite, but locally, in the mine at Talleville and more especially in the mines at Fowler, where there are slips in the schist, the talc is foliated.

The talc is limited to the schist from which it was formed and, from what may be seen in the large underground workings of the International Pulp Company's mine No. 3 at Talleville, it apparently is only the middle portion of the layer of schist that has been changed to talc, thus forming an irregular layer of talc within the layer of schist. The layer of talc varies in thickness from a few feet to over 50 feet, averaging perhaps about 20 feet, and is remarkably persistent. It has been mined locally to a depth of 550 feet and horizontally for a much greater distance, though it is probable that but a small part of the total deposit has yet been removed.

The mining operations do not extend throughout the length of the belt. They are most extensive toward the northeast end, about Talleville. Near the southwest end, in the vicinity of Fowler, operations are less active.

Three companies, the International Pulp Company, the Ontario Company, and the Union Talc Company, reported production in 1908, but in May, 1909, only the first two were in operation.

The International Pulp Company, having acquired the holdings from several independent companies, has become by far the largest producer of talc in the United States. The company has two mills running, both at Hailesboro. The mill, recently constructed of concrete, is said to have a capacity of 100 tons per day. Notwithstanding the low water of the talc belt in 1908 and the consequent decrease in the power of the mills, the output in the district was not only maintained but slightly advanced over that of 1907. The advance in output was accompanied by an advance in price from \$8 to \$10 per ton.

^aThe genesis of the talc deposits of St. Lawrence County, N. Y.: School of Mines Quart., vol. 17, No. 4, pp. 333-341.

The excellence of the fibrous talc for filling book and writing papers has given it a wide market, and much of it is exported to Europe, where it is replacing clay in the paper industry.

VERMONT.

Vermont was the third among the States in the production of talc and soapstone, having produced 10,755 short tons—about half as much as Virginia and one-seventh as much as New York. Its production in 1908 decreased in quantity 33 per cent from that of 1907; nevertheless the reported value of the output, in which much of the product was manufactured, increased about 29 per cent over that of 1907. It is the only State in which an increase in the value is coupled with a decrease in the quantity of the output. This is due to the fact that in 1908 a larger proportion of the production was sold manufactured than in the previous year.

There were eight operating mines in this State; six of these, producing 90 per cent of the state's output, sold their entire product ground; only two quarried and manufactured articles of soapstone.

According to G. H. Perkins, state geologist of Vermont,^a talc occurs in beds of noticeable size in or near the towns of Granville, Moretown, Rochester, Stockbridge, Bridgewater, Roxbury, Duxbury, Lowell, and Johnson.

In the northern part of the State, near the village of Johnson, there is a small mine in talc schist so folded as to render mining difficult. There is some good talc, but the grade of most of it is lowered by the presence of small flakes of pyrite.

At East Granville the talc mined is a typical talc schist, and it stands on edge between other schists, of which mica schist is the most common. The talc is in the form of a bed and not of a vein. It is not entirely continuous, but is made up of a series of talc lenses in the same plane. The lenses range in thickness from a few inches to 30 feet and in length up to 200 feet. The mine is worked by several drifts running north on the bed into the steep hillside about 300 feet above the mill by the railroad station. The ore is carried to the mill by a gravity tramway. The mine exceeds the capacity of the mill, and part of the ore is shipped and ground by the paper company that uses it. The location of the mine with reference to topography, drainage, and transportation is decidedly advantageous.

About 12 miles farther south the same bed apparently is mined near Rochester and also at Stockbridge, but under somewhat less favorable conditions.

Three miles west of Chester talc is mined at Carlton's and is sold in Chester at the mill of the American Soapstone Finishing Company, which early in 1909 leased the Carlton quarry.

Near Windham is a mine and mill recently closed by litigation.

Professor Perkins remarks that there are extensive beds of soapstone in the towns of Cavendish, Grafton, Chester, Weathersfield, Athens, and Windham. Although some of the many masses of soapstone are of excellent quality, there is a large quantity unfit for use. In 1908 it was mined at three localities—Chester, Athens, and Perkinsville.

In Chester the Union Soap Company formerly worked two quarries, one, not now in operation, a few miles south of the village and

^a Eng. and Min. Jour., October 7, 1908, p. 753.

the other at Athens, 10 miles away. The soapstone, well exposed in the open pits, is seen to form lenses within gneiss. The lenses are from 4 to 20 feet thick and 20 to 30 feet wide, and overlap. The stone is soft and easily sawed, turned, planed, or grooved. It is quarried by using channeling machines, but unfortunately the material varies. Much of it is cracked, but the smaller part is excellent.

The soapstone mill destroyed by ice some years ago at Perkinsville is being rebuilt, and already a part is in operation manufacturing tubs, sinks, furnaces linings, and numerous other objects.

OTHER STATES.

Georgia.—The Murphy marble of North Carolina extends far into Georgia, but the important deposits of talc associated with it in North Carolina have not been found to any great extent in Georgia. There are, however, several small but active mines in Murray County.

Maryland.—The Deland Mining and Milling Company at Bald Friar quarry, near Havre de Grace, was the only one operated during 1908 in Maryland, and it reports the same production as in 1907, although the total production of the State decreased about 29 per cent. The product was chiefly ground and sold^a to the manufacturers of acid-proof and fireproof paints.

Pennsylvania.—In Pennsylvania there were two mines operating, one in Montgomery County, the Atlas Mineral and Machine Company, and the other in Northampton County, the J. O. Wagener & Co. mine, both in the eastern part of the State. The first locality is briefly referred to in the Philadelphia folio^b as an old soapstone quarry (rose quarry) that has been recently reopened on the west bank of the Schuylkill and that furnishes material of good quality for stove and furnace linings, as a filler in the manufacture of paint and paper, and as a lubricant.

New Jersey.—In New Jersey, 2 miles north of Phillipsburg, is the mine of the Lizzie Clay and Pulp Company. In 1908 it was the only producing mine in the State. The production of Pennsylvania and New Jersey for 1908 decreased 37 per cent from that of 1907.

Rhode Island.—The Rhode Island Soapstone Company at Manville, in Providence County, was the only company operating in that State during 1908.

Massachusetts.—There were two producing mines in Massachusetts, the Berkshire Talc and Manufacturing Company in Dalton, in Berkshire County, and the Massachusetts Talc Company near Rowe, 3 miles north of Zoar, in Franklin County, where a new mill was erected in 1907, which raised Massachusetts to the distinction of being the only State, except New York, whose production in 1908 was greater than in 1907.

Of all the material reported from the mines in Georgia, Maryland, Pennsylvania, New Jersey, Rhode Island, and Massachusetts, a small production of crude was reported by only two. With this exception, all the product was ground. The great center of the sawed soapstone industry is in Virginia. South of Virginia, as well as north, approximately all of the talc is ground until Vermont is reached, where again a considerable part of the material is sawed.

^a Maryland Mineral Industries, 1896-1907, Maryland Geol. Survey special publication, vol 8, pt. 2, p.160.

^b Philadelphia folio (No. 162), Geol. Atlas U. S., U. S. Geol. Survey, 1908.

